Wisconsin's Forest Resources

Acreage in timberland in Wisconsin is increasing and currently stands at over 16 million acres. These forests are becoming middle-aged with major increases in stands 60 to 100 years old. Most forestland is privately owned and located in northern and central parts of the state.

Volume is increasing and is currently over 20 billion cubic ft. The species with the highest volume are red oaks, soft maple and aspen. Growth rates are increasing but mortality and removals have remained static for the last 10 years.

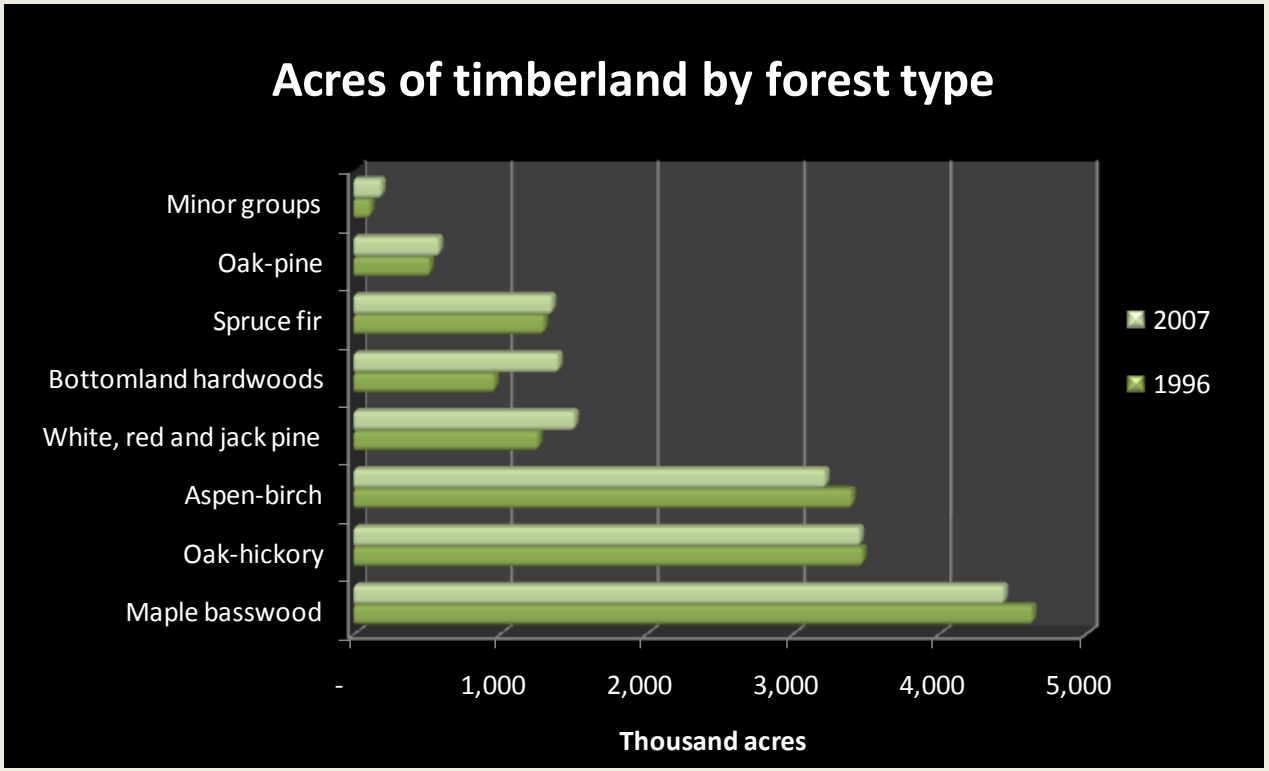
- *How have Wisconsin's forests changed?*
  Acreage by stand age class, forest type and size class
- *What are the major species and how have they changed?*
  Volume by major species: 1983, 1996, and 2007
- *Who owns our forests?*
  Timberland ownership by group
- *What types of forests do we have?*
  Acreage and map of timberland by forest type
- *How much wood do we have?*
  Growing stock volume: 1983, 1996, and 2007
- *How fast are our forests growing?*
  Average annual net growth: 1983, 1996, and 2007
- *How healthy are our forests?*
  Average annual mortality: 1983, 1996, and 2007
- *How much wood do we harvest?*
  Average annual removals: 1983, 1996, and 2007

"How have Wisconsin's forests changed?"

Acreage by stand age class, forest type and size class

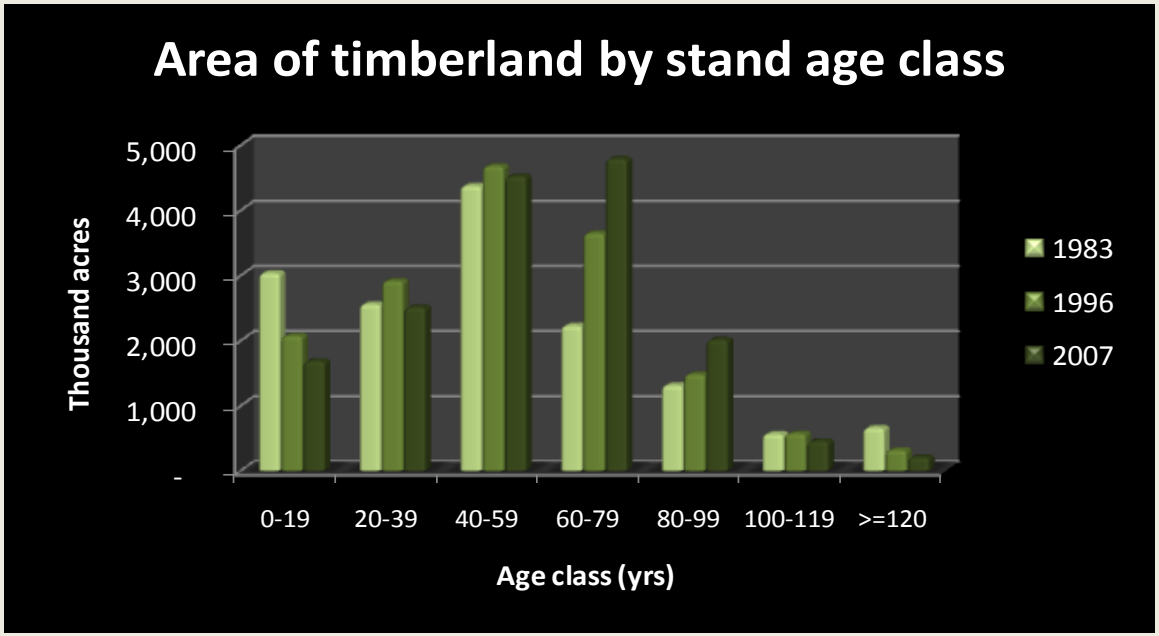
There are approximately 16.2 million acres of **timberland** in Wisconsin in 2007. This is an increase of 1.3 million acres since 1983 and 341 thousand acres since 1996.

About ¾ of all timberland is classified as either maple basswood, oak-hickory or aspen-birch forest type. In the last 10 years, the acreage in these 3 types has either stayed the same or decreased and the number of acres in red, white, and jack pines, bottomland hardwoods, spruce fir and oak-pine has increased.



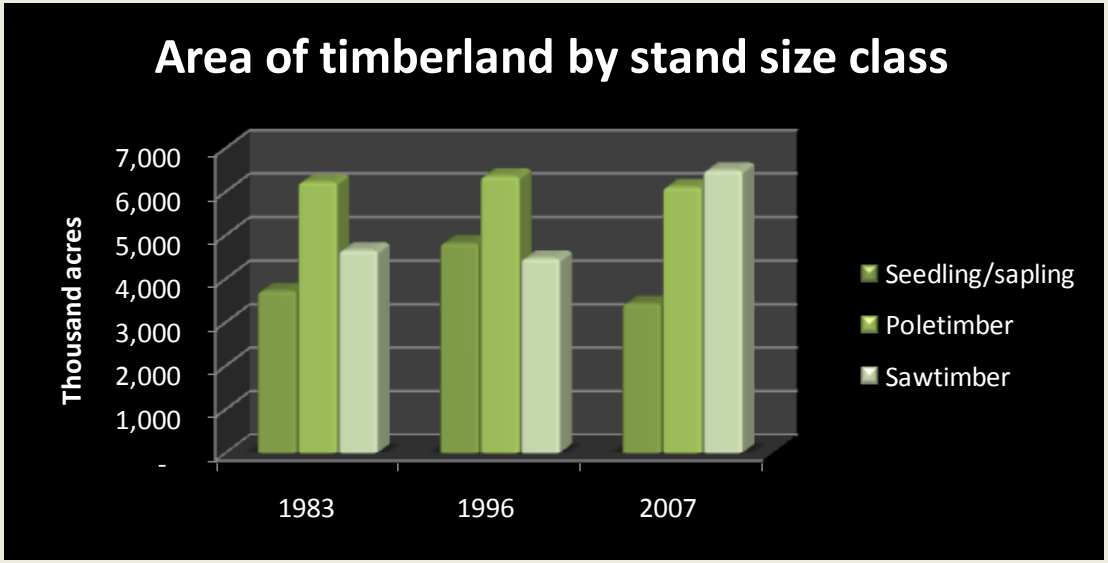
Source: USDA Forest Service, Forest Inventory & Analysis 2007 data

Wisconsin's forests are becoming **middle-aged** with fewer acres in the very youngest and very oldest age classes. In 1983, 21% of acreage was less than 20 years old but, this decreased to only 10% in 2007. In addition, 4.5% of acreage was at least 120 years old in 1983. This age class represents only 1.3% of timberland in 2007.



Source: USDA Forest Service, Forest Inventory & Analysis 2007 data

Area in sawtimber has increased by about 1.5 million acres from 1983 to 2007 and acreage in seedling/sapling stands has decreased slightly.



Source: USDA Forest Service, Forest Inventory & Analysis 2007 data

"What are the major species and how have they changed?"

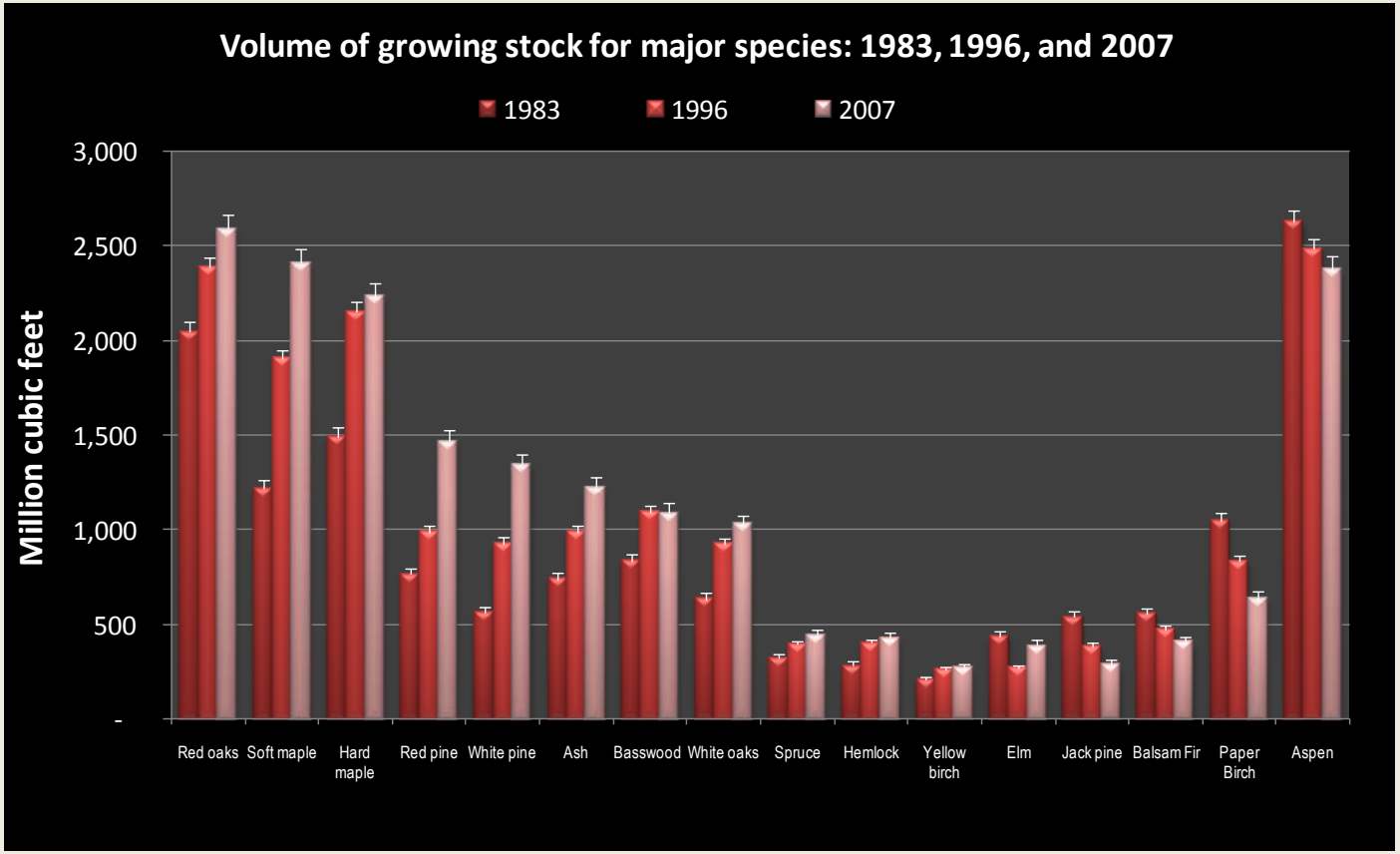
Growing stock volume by major species

The greatest volume of any major species in 2007 is in the **red oak group** (northern red oak, black oak, northern pin oak)**.** Volume in this group has increased 27% since 1983. The second highest volume is in **soft maples** (red maple, silver maple) where volume has increased 98% in the last 23 years.

The greatest percentage **volume gains** in the last two decades have been in white pine (138%), soft maple (98%), red pine (92%), ash (66%), and the white oak group (63%, white oak, bur oak, swamp white oak).

The greatest percentage **volume losses** in the last 23 years have been in jack pine (47%), paper birch (39%), balsam fir (26%), and aspen (10%).

The volume in elm (American elm, slippery elm, rock elm, Siberian elm) decreased between 1983 and 1996, but has increased 45% since 1996.

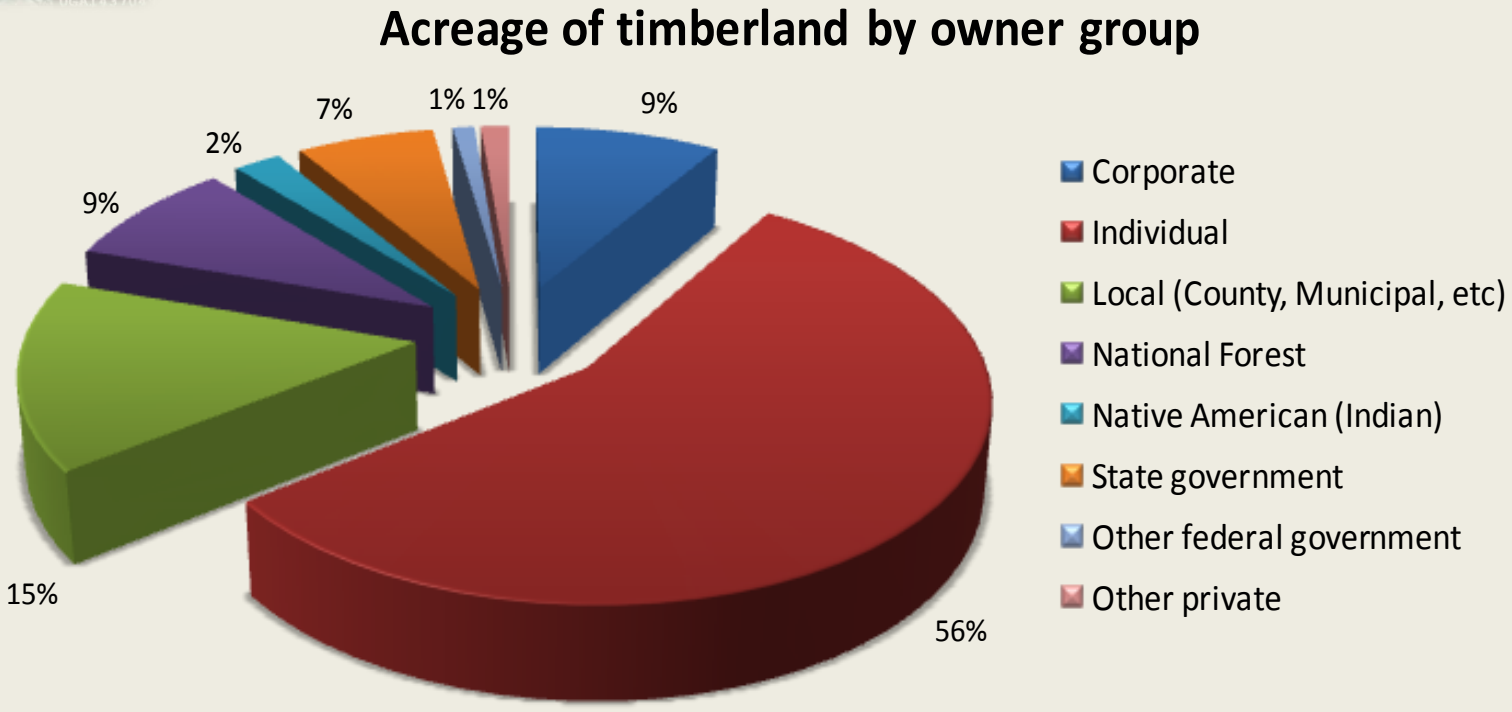


Source: USDA Forest Service, Forest Inventory & Analysis 1983, 1996, and 2007 data

"Who owns Wisconsin's forests?"

Timberland ownership by group

About **one third of Wisconsin's timberland is owned by the public**: federal, state, county, and municipal governments. Over half is owned by private individuals and 10% by corporate and other private entities.



Source: USDA Forest Service, Forest Inventory & Analysis 2007 data

"What types of forests do we have?"

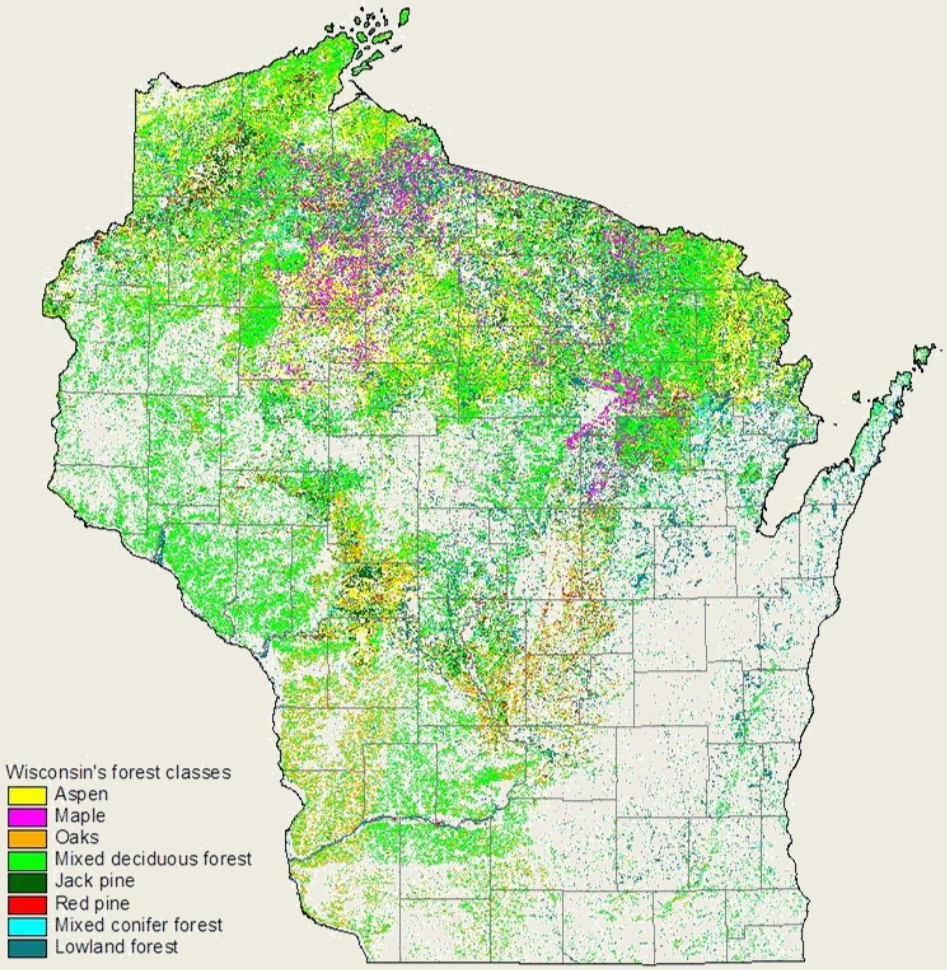
Acreage and map of Wisconsin's timberland by forest type

Wisconsin's forests are located mostly in the northern and central parts of the state. Pine and oak-pine predominate in the sandy soils of central, northwest and northeast Wisconsin. Oak-hickory forest type occurs mostly in the southwest and central parts of the state. Aspen-birch, maple-basswood and spruce fir are primarily northern forest types. Bottomland hardwoods are distributed throughout the state in low-lying areas.

Acres (1000) of timberland by major forest type and region of the state

Forest type group	North west	North east	Central	South west	South east	Total
Maple basswood	490	1,404	1,717	320	515	4,446
Oak-hickory	1,079	281	623	346	1,131	3,461
Aspen-birch	416	1,034	1,587	67	122	3,226
White, red and jack pine	542	446	410	45	69	1,512
Bottomland hardwoods	286	218	425	254	219	1,403
Spruce fir	124	632	532	64	5	1,357
Oak-pine	241	155	149	13	27	585
Minor types*	46	43	32	44	26	192
Grand Total	**3,225**	**4,213**	**5,474**	**1,154**	**2,116**	**16,182**

* Includes nonstocked land, exotic hardwoods and exotic softwoods.
Source: USDA Forest Service, Forest Inventory & Analysis 2007 data



Source: WISCLAND land cover, Wisconsin Dept. of Natural Resources, 1998

"How much wood do we have?"

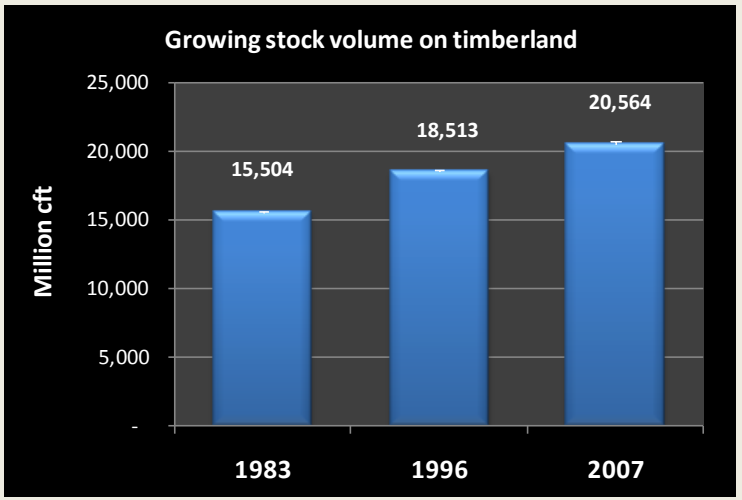
Growing stock volume by species and year

Growing stock volume in million cubic feet on timberland

Species group	1983	1996	2007
Red oaks	2,046	2,389	2,590
Soft maple	1,220	1,907	2,411
Aspen	2,626	2,483	2,375
Hard maple	1,493	2,155	2,233
Red pine	763	988	1,469
White pine	566	929	1,344
Ash	737	989	1,223
Basswood	836	1,093	1,091
White oaks	632	926	1,029
Paper Birch	1,047	832	635
Spruce	324	394	438
Hemlock	284	402	429
Balsam Fir	553	471	407
Elm	435	269	389
Jack pine	538	382	287
Yellow birch	208	261	269
Minor species	1,197	1,634	1,944
Total Volume	**15,504**	**18,504**	**20,564**

Source: USDA Forest Service, Forest Inventory & Analysis 1983, 1996, and 2007 data

Wisconsin has over 20 billion cubic feet of growing stock volume in trees over 5 inches in diameter. The volume of eastern white pine, red pine and elm has almost doubled since 1996. Soft maple and ash volume has also increased by about 25%. Of all species, jack pine underwent the largest decrease in volume: 25% since 1996. Balsam fir, paper birch and aspen also have shown declines in volume.

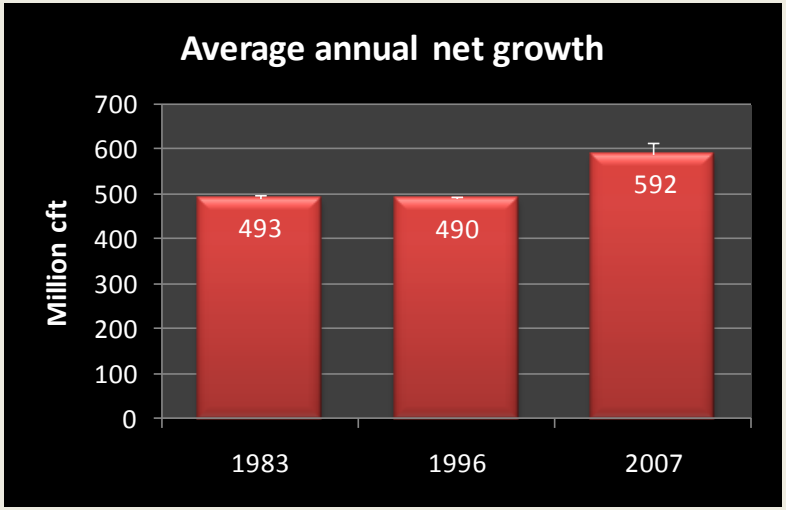


Source: USDA Forest Service, Forest Inventory & Analysis 1983, 1996, and 2007 data

"How fast are our forests growing?"

Average annual net growth by species and year

Average annual net growth has increased about 20% since 1983. The average ratio of growth to volume is 2.9% statewide but some species surpass this. For instance, red pine has a growth to volume ratio of 4.7% and white pine has a ratio of almost 4%. Paper birch, yellow birch, balsam fir, hemlock and jack pine have growth ratios far below average.



Source: USDA Forest Service, Forest Inventory & Analysis 1983, 1996, and 2007 data

Species group	Growing stock volume (million cft)	Average annual net growth (million cft)	Ratio of growth to volume
Red pine	1,469	69	4.7%
White pine	1,344	53	3.9%
Ash	1,223	44	3.6%
Hickory	266	9	3.4%
Minor species	1,685	54	3.2%
Soft maple	2,411	76	3.1%
Aspen	2,375	69	2.9%
Red oaks	2,590	67	2.6%
Hard maple	2,227	57	2.6%
Spruce	438	11	2.5%
Basswood	1,091	26	2.4%
White oaks	1,028	24	2.3%
Elm	389	9	2.2%
Jack pine	287	6	2.1%
Hemlock	429	8	1.9%
Balsam Fir	407	6	1.6%
Yellow birch	269	4	1.4%
Paper Birch	635	0	0.1%
Total	**20,564**	**592**	**2.9%**

Source: USDA Forest Service, Forest Inventory & Analysis 2006 data

"How healthy are our forests?"

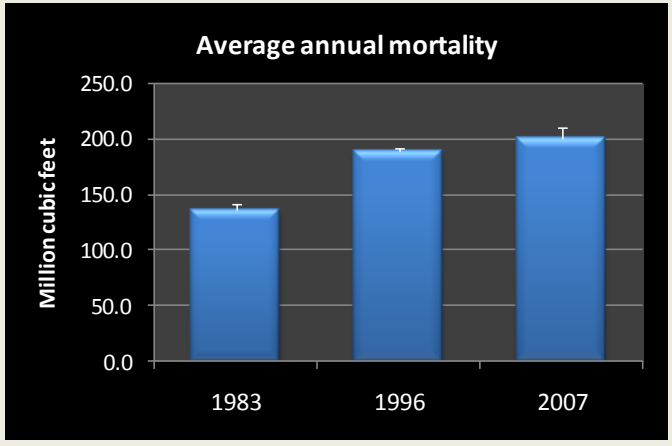
Average annual mortality by species and year

Species group*	Annual mortality (million cft)	Annual gross growth (million cft)	Ratio of mortality to gross growth
Paper Birch	17	18	97%
Balsam Fir	19	26	75%
Elm	20	29	70%
Jack pine	6	12	49%
Aspen	54	123	44%
Yellow birch	2	6	34%
Spruce	5	16	33%
Red oaks	23	90	25%
Hemlock	2	10	21%
White oaks	6	30	20%
Hickory	2	11	19%
Other species	11	65	16%
Basswood	4	30	14%
Ash	7	51	14%
White pine	7	60	12%
Soft maple	9	85	11%
Hard maple	5	62	8%
Red pine	2	70	3%
Grand Total	**201**	**793**	**25.4%**

*Certain species groups were omitted due to high standard errors.
Source: USDA Forest Service, Forest Inventory & Analysis 1983, 1996, and 2007 data

Overall, average annual mortality has not changed significantly since 1996 but certain species have experienced elevated mortality. For instance, paper birch, balsam fir, elm, jack pine, aspen, yellow birch, and spruce have experienced mortality rates above the average for all species.

The species with the lowest ratios of mortality to growth are red pine, hard and soft maple, white pine, ash, and basswood.

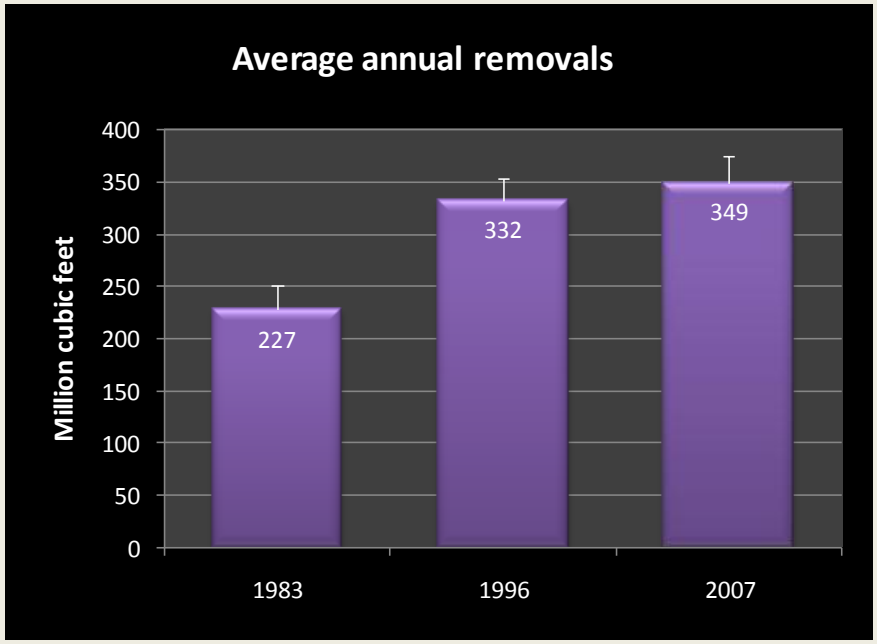


Source: USDA Forest Service, Forest Inventory & Analysis 1983, 1996, and 2007 data

"How much wood do we harvest?"

Average annual removals by species and year

On average, we harvest 59% of net annual growth but certain species have experienced greater harvest levels. For instance, average annual removals for paper birch, jack pine, aspen and balsam fir exceeded annual growth. Yellow birch, spruce and red and white oaks all had removal to growth ratios above the average for all species in the state.



Source: USDA Forest Service, Forest Inventory & Analysis 1983, 1996, and 2007 data

Average annual removals and annual net growth, and the ratio of removals to growth.

Species group*	Annual removals (million cft)	Annual net growth (million cft)	Ratio of removals to growth
Paper Birch	14.6	0.5	>1000%
Jack pine	13.2	6.1	215%
Aspen	77.3	69.0	112%
Balsam Fir	6.4	6.4	101%
Spruce	7.9	11.0	72%
Red oaks	46.1	67.3	69%
Yellow birch	2.6	3.7	69%
White oaks	14.7	24.1	61%
Hard maple	33.5	57.1	59%
Soft maple	43.5	75.6	58%
Basswood	13.6	26.0	52%
Red pine	26.7	68.6	39%
Elm	3.2	8.7	37%
White pine	15.3	52.7	29%
Ash	11.3	43.6	26%
Hemlock	2.1	8.2	25%
Grand Total	**349.2**	**591.9**	**59%**

*Certain species groups were omitted due to high standard errors but the totals include all species.

Source: USDA Forest Service, Forest Inventory & Analysis, 2007 data